

## Relational Responding in Parents

Amy R. Murrell, Kelly G. Wilson, Cicely T. LaBorde, Chad E. Drake, & Leslie J. Rogers

### Abstract

This study investigated the relationship between parenting stress and relational conditioning. Fourteen students who were not mothers, 14 mothers who reported high parenting stress and 14 mothers with low parenting stress completed two matching-to-sample (MTS) computer tasks, each requiring formation of three 3-member classes. The first MTS task examined class acquisition, with neutral symbols and stimuli theorized to be emotionally relevant to parents (i.e., negative child behavior words) or not (i.e., fruit or medical words). The second task required participants to form classes that included symbols, negative child behaviors and positive parenting words. Statistical analyses were conducted on number of trials needed to meet criterion, percent correct in training and testing, and latency to respond. Overall, distressed mothers were slower to respond than other participants. However, in MTS 1, they responded more quickly and made fewer errors in response to stimuli in the child behavior class. Further, they obtained a higher percent correct for these items than the other participants. In the second MTS, distressed mothers required more trials to reach criterion and made more errors than the other participants. Findings indicate that emotionally relevant stimuli are easily related to other things. However, once formed, emotionally relevant classes are difficult to relate in new ways. The findings may have important clinical and treatment implications for parents, particularly if computer responding relates to “real-world” inflexible parenting.

Keywords: matching to sample, relational responding, human parents

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Parenting is perceived and experienced as difficult (Wahler & Dumas, 1989). Parenting involves a complex set of behaviors that emerge through a given parent's learning history, including respondent and operant processes. These same processes lead to the emergence of problematic parenting behaviors (e.g., the “coercive process”). To use a classic example, think of a mother and child in the checkout line at the grocery store. The child begs, softly at first, to get a toy. The mother says no and asks the child to be quiet. The child raises his voice and begins to cry. The mother still says no, and the child's behavior escalates. The mother gets embarrassed. Elicitation goes up, and she is extremely uncomfortable. At this point, many mothers would respond in one of two ways: aggression or acquiescence (Patterson, 1982). Let's say that the mother gives in and buys the child a toy. Both the behavior of the mother and the behavior of the child are reinforced. The child's screaming and crying is now more probable, because it worked to get what he wanted. The mother's acquiescence (and the same would be true of aggression) is negatively reinforced as the child stops misbehaving in response to it. This can be a problem in the long run.

Another common feature of parenting difficulties is parenting stress. Parenting stress is the “aversive psychological reaction to the demands of being a parent” (Deater-Deckard, 1998, p. 315). Parenting stress is related to insecure attachment (Teti, Nakagawa, Das, & Wirth, 1991), child abuse and neglect (Mash & Johnston, 1990), and a host of parent and child emotional problems (for review see Deater-Deckard, 1998).

Numerous strategies have been employed to reduce the problems associated with parenting and parenting stress, including behavioral-parent training. Behavioral-parent training programs teach parents the necessary skills to positively interact with, and discipline, their children. These programs, which are based on principles of respondent and operant conditioning, have demonstrated large and lasting improvements in child behavior (for review see Kazdin, 2003; Patterson, 1982). However, there is evidence that gains are attenuated if the parent is experiencing psychopathology, is economically disadvantaged, or has frequent negative interactions with other adults (Dumas, 1984; Kazdin, 1997).

Perhaps problems in parenting are not sufficiently explained as skills deficits resulting from direct conditioning processes alone. Certainly respondent and operant conditioning processes are featured prominently in a parent's learning history. Data indicate that these processes contribute to the development and maintenance of problematic parenting behavior as well as to the failure to respond to treatment. It is possible, however, that problems in parenting, and in the application of parenting skills, are the result of indirect relational conditioning processes as well.

### *Indirect Learning and the Matching-to-Sample Paradigm*

Verbally competent humans show a form of indirect learning called derived relational responding. Stimulus equivalence is the basis for relational conditioning. In Sidman's (1971) classic experiment, a learning-disabled participant was trained to match spoken words to pictures that represented them and then trained to match those spoken words to their printed forms. The participant, without additional training, then matched printed words to pictures and pictures to printed words. Sidman stated that the stimuli became equivalent to each other, and thus formed an equivalence class.

Equivalence classes have three defining characteristics: reflexivity, symmetry, and transitivity or equivalence. Reflexivity means that the events related to each other show the same relation to themselves. As evidence of reflexivity, when presented with the stimulus "1", participants will select "1" from an array of 1, 2, and 3. Symmetry indicates that relations between events are reversible. For example, when a participant is trained an A-to-B relationship, he or she will derive a B-to-A relationship. Transitivity occurs when relations among events emerge because of an indirect relationship that exists between them. For example, a participant with A-to-B training and B-to-C training will derive A-to-C and C-to-A relationships. All three of these properties must emerge without explicit reinforcement (Sidman, 1990).

Stimulus equivalence is most often studied in a matching-to-sample (MTS) paradigm. In a visual example of such a paradigm, a stimulus is presented at the top of a computer screen. Comparison stimuli are provided at the bottom of the screen. Selecting the "correct" comparison stimulus is then reinforced. Comparison stimuli are arbitrarily assigned as either correct or incorrect by the experimenter. The subject is taught, through direct reinforcement, that given stimulus A1 and comparisons B1, B2, and B3, pick B1, not B2 or B3. In further training, the subject is taught that given the stimulus A1 and another set of comparisons, C1, C2, and C3, pick C1. Given these two directly trained relations among stimuli, verbally competent human subjects will readily derive others. Humans will select A1 from an array of A stimuli given A1 as the sample (reflexivity), A1 from an array of A stimuli where either B1 or C1 is the sample (symmetry), B1 from an array of B stimuli, where C1 is the sample, and C1 from an array of C stimuli where B1 is the sample (equivalence). To date there is no unequivocal evidence that this equivalence class formation occurs in non-humans, or in mentally retarded humans who are not verbally competent (Devany, Hayes, & Nelson, 1986). Most MTS studies of stimulus equivalence initially involved irrelevant or experimentally novel stimuli. However, a few studies have examined equivalence class acquisition with emotionally relevant stimuli.

### *Stimulus Equivalence Class Acquisition*

A series of studies by Plaud and colleagues using the matching-to-sample task suggest that emotions impact class acquisition. Specifically, Plaud (1995) found that participants required more training trials to derive relations with snake-related words than with flower-related words. He also found that participants who reported fear of snakes took more training trials than less fearful individuals. In a similar study, Plaud, Gaither, Franklin, Weller, & Barth (1997) found that subjects took more training trials and made more errors when learning equivalence classes that contained sexually explicit words than when learning classes comprised of sexually ambiguous and neutral words. In another study, Plaud,

Gaither, Weller, Bigwood, Barth, & Von Duvillard (1998) compared the formation of stimulus equivalence classes with words relevant to Rational-Emotive Behavior Therapy (REBT), non-REBT but otherwise emotional words, and neutral words. Participants required more training to form REBT, or emotionally-relevant classes, than either of the comparisons.

Wilson (1998) examined stimulus equivalence class acquisition in alcoholics and non-alcoholics. He found that, overall, alcoholics made more errors in class acquisition than non-alcoholics did. He also found, however, that alcoholics more readily acquired classes with drug-related stimuli than classes with non-drug-related stimuli. Control participants showed no differential abilities.

This seems contradictory to Plaud's 1995, 1997, and 1998 studies, in which emotionally relevant classes were more difficult to form. Wilson noted a confound in Plaud's studies. He wrote that Plaud was actually asking participants to parse pre-existing classes. In effect, Plaud (1995) was requiring snake phobics, for example, to form 2 different classes with snake-related stimuli when such snake-related stimuli likely represented a single, pre-existing class for the participants. Wilson noted that there may be a difference in the abilities of participants to parse pre-existing emotionally relevant classes (such as in Plaud's studies) and to acquire new members to classes with emotionally relevant stimuli (as in his study). He accounts for the discrepancies in findings by pointing to a potential common influence- the inflexibility of responding to classes that involve emotionally relevant stimuli. Perhaps participants in Plaud's studies showed differential formation because the pre-existing classes with emotionally relevant stimuli were rigid and the neutral classes were not. The rigidity, based on extensive psychologically relevant learning histories, could hinder class formation (Wilson, 1998).

### *Inflexibility in Class Formation*

Several researchers have found experimental evidence of this inflexibility in MTS tasks. In a study of anxious and non-anxious individuals, Leslie et al. (1993) looked at class formation with psychologically relevant stimuli, specifically, anxiety-related words (e.g., job interview) and pleasant adjective states (e.g., calm). The researchers found that non-anxious individuals could derive relations between anxiety-provoking situations and pleasant adjective states that participants with anxiety disorders could not (Leslie, Tierney, Robinson, Keenan, Watt, & Barnes). Barnes, Lawlor, Smeets, and Roche (1996) found that both mildly mentally handicapped children and non-handicapped children were able to learn relations between nonsense syllables and their own names, and between nonsense syllables and the word "Able". However, the handicapped children experienced more difficulty than non-handicapped children in demonstrating a derived relation between their personal name and the word "Able" (Barnes et al., 1996). Finally, Watt, Keenan, Barnes, & Cairns (1991) conducted a study comparing relational responding abilities of Northern Irish Catholic individuals, Northern Irish Protestant individuals, and English Protestant individuals. The researchers found that compared to English participants, Irish participants were unable to derive relations between Protestant symbols and Catholic names (Watt et al.).

The aforementioned studies suggest that class acquisition may be facilitated when a new class is to be formed with emotionally relevant stimuli and neutral stimuli alone (e.g., Wilson, 1998). However, when the new class to be formed requires the parsing of a pre-existing emotionally relevant stimulus class (e.g., Plaud, 1995) or when the new class is to be formed with stimuli from different, potentially inconsistent, pre-existing emotionally relevant classes of stimuli (e.g., Leslie et al., 1993), stimulus equivalence class acquisition may be more difficult. For example, in several of the mentioned studies, research participants were trained through reinforcement that certain stimuli were to be paired. However, they performed in a manner contradictory to the provided contingencies, presumably because they were relying on their personal and pre-existing training. Such failure to parse pre-existing classes or to form new classes that combine seemingly contradictory pre-existing classes can be referred to as inflexibility.

Inflexibility with respect to class may reflect a behavioral rigidity. Psychopathology has been characterized by narrow and inflexible behavior patterns in spite of negative consequences (Wilson & Murrell, 2004). This results in less contact with the environment and fewer opportunities to learn new behaviors. Referring back to the coercive process, the child and parent exhibit narrow and inflexible responding. However, because the mother avoids embarrassment and related events, she has no opportunity to learn more productive behaviors.

As parenting behaviors cannot be separated from the social-verbal community in which they occur, it is reasonable to assume that parents construct equivalence classes about their children's behavior and their responses to it. For a parent experiencing significant parenting stress, "child tantrumming" is likely not in an equivalence class with "reinforce good child behavior." If such classes are difficult for these parents to form, this may result in difficulty applying parenting skills that are learned.

To increase the effectiveness of behavioral parent treatments, the issues of equivalence class acquisition and maintenance (i.e., indirect conditioning) and their effects on behavior must be examined. To date, the role of derived relational responding has not been examined with respect to parenting. More knowledge about how classes are formed and how they can be disrupted might lead to more effective parenting interventions. Therefore, the present study sought to examine these processes with parenting-relevant stimuli.

#### *Current Study*

The current study sought to further investigate class acquisition with emotionally relevant stimuli and flexibility in responding when new classes are to be formed with stimuli from pre-existing and potentially inconsistent classes (based on previous learning history). These processes were examined using emotionally-relevant, parenting-related stimuli in two matching-to-sample (MTS) tasks with groups of distressed and nondistressed mothers as well as a group of female students who were not parents. In each MTS task, participants were to form three, 3-member classes in which words and arbitrary symbols were the stimuli.

MTS Task 1 was designed to assess differential class acquisition using parent-relevant and neutral stimuli. Participants were to complete this MTS task by forming three, 3-member stimulus classes in which two of the stimuli were arbitrary symbols and the third stimulus in each was a set of more- (e.g., negative child behavior words) or less- (e.g., fruit or medical words) emotionally relevant words. Based on previous studies and literature review, several hypotheses were formed: (a) distressed mothers would have more general difficulty with all of the tasks, (b) distressed mothers would acquire classes with negative child behavior words more readily than classes with fruit or medical words, (c) class formation with less emotionally relevant stimuli would be generally the same across groups, and (d) differential facilitation was expected with regard to classes involving parent-relevant stimuli (i.e., child-behavior words). Specifically, parenting-relevant stimuli would control a higher percentage of correct responses, and a shorter latency to respond among parents than among non-parents.

MTS Task 2 was designed to examine the role of parenting stress in the ability to flexibly relate, in new ways, pre-existing emotionally relevant classes of stimuli. Participants were asked to form three, 3-member classes in which stimuli were arbitrary symbols, negative child behavior words, and positive-parenting words. Based on previous studies and literature review, two hypotheses were formed: (a) again, distressed mothers would have more general difficulty with all of the tasks, and (b) non-mothers should have the least difficulty pairing negative child behaviors with positive parenting behaviors, non-distressed mothers would have some difficulty with that pairing, and distressed parents would have the most

difficulty as measured by blocks to meet criteria, percentage of correct responses, and average response latencies.

### Method

#### *Participants*

Adult female participants were recruited from 4 sites: the psychology department of a small state university in the Southeast United States, the on-campus daycare at the same institution, a local community mental health center, and a nearby center designed for the prevention of family violence. Students were provided extra credit, and non-students were paid and had their names entered into a raffle for a gift card.

Recruitment continued until 3 groups of 14 women had completed the study. Participants were placed into groups based on their parental status. Those with children were also placed in groups based on their scores on the Parenting Stress Index. The groups were comprised of fourteen students who were not mothers, fourteen mothers who had PSI scores below the clinical cut-off (85<sup>th</sup> percentile), and fourteen mothers with PSI scores above the cut-off completed the project.

The group of female students who were not mothers consisted of women aged 19 to 37, with a mean age of 23. All of them had completed some college, and none had yet completed a 4-year college degree. Most of them (86%) listed their income as equal to or less than \$30,000 per year.

The non-distressed mothers group consisted of women aged 21 to 53, with a mean age of 33. All of them had 3 or fewer children. The education level of participants in the group ranged from high school or equivalent diploma to completed graduate degrees, with 43% of the women having some college education but no degree. About 57% of the group had incomes of equal to or less than \$30,000 per year, although the range of income was wide (from under \$15,000 to over \$75,000).

The distressed mothers group consisted of women aged 18 to 52, with a mean age of 34. More than half (57%) had 3 or more children. The education level of participants in the group ranged from less than 8<sup>th</sup> grade to completed graduate degrees, with 43% of the women having some college education but no degree. About 64% of the group had incomes of equal to or less than \$30,000 per year.

#### *Measures*

*Demographics Questionnaire.* Each participant completed a brief questionnaire that assessed the following: gender, marital status, current age, highest level of education, current income range, age at which first became a parent, number of children, age(s) of child (ren), and social support.

*MTS Task Variables.* A software program was designed to collect data on three relevant variables throughout each matching-to-sample computer task. Number of trial blocks required to meet criterion in each phase, latency for each item, and percent correct in each phase were examined.

*Parenting Stress Index.* The Parenting Stress Index (PSI; Abidin, 1990) is a 120-item self-report measure used to examine levels of parenting stress. Parents of children age 12 and younger answer items on a 5-point scale. PSI Total Stress scores were used to group participants with respect to distress. Responses were also examined to look for relationships among demographics, PSI scores, and task performance.

*Hopkins Symptom Checklist-25.* The Hopkins Symptom Checklist-25 (HSCL-25; Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974) is a self-report, 25-item screening measure, which assesses

symptoms of anxiety and depression. All items are answered on a 1 to 4 scale that ranges from “not at all” to “extremely”. In the current study, total scores were used as a measure of general distress.

### *Procedures*

All sessions were conducted in a quiet and well-lit room at the facility where they were recruited. Most participants were run individually. There were a few occasions in which multiple participants concurrently completed the experiments. At these times, participants were separated by cardboard dividers or spaced throughout a large room, and provided headphones.

All participants were seated at a desk or table with either a desktop or laptop computer in front of them. Most participants completed the entire study in one sitting; however, there were a few who completed the first and second MTS tasks in 2 sessions, separated by approximately 1 week. During the session, participants (a) were consented and assigned a code number, (b) completed the demographics questionnaire and HSCL-25 (c) completed the PSI if they had not already (some mothers at the violence prevention center had recently completed the measure), (d) participated in the brief MTS familiarization session, (e) completed MTS Task 1, and (f) completed MTS Task 2. Sessions required 1-3 hours to complete.

Familiarization with MTS Task. The familiarization task was used in order to acquaint participants with the training and testing process that would occur in MTS Tasks 1 and 2. The familiarization task consisted of two phases. In the first phase, subjects were trained to select one of two comparison stimuli (B1, B2) in the presence of sample stimuli (A1, A2). All visual stimuli appeared in black-and-white and were approximately 2 inches high and 2 inches wide. Two of them were arbitrary symbols and the other two were sets of words presented in groups of 4. To avoid interference, stimuli used in MTS Tasks 1 and 2 were not used in this process.

*Stimuli.* The words used as stimuli were chosen with several characteristics as criteria. They were readable at a level of high school education or less, were moderately long in length (as the tasks involve long stimuli), and were balanced in valence (as were class members in MTS Task 1), but were high in dimensions of concreteness, imagery, categorizability, familiarity, meaningfulness, and number of attributes or features as defined and analyzed in the Handbook of Semantic Word Norms (Toglia et al., 1978).

Instructions for this task were reviewed verbally with participants and were also presented on the computer screen as follows: “Hello. Thank you for taking part in this experiment. Your instructions are very simple. One box will be displayed at the top of the screen and two along the bottom. You must choose one of the two along the bottom. Click on the PRACTICE button below for a few examples.” Once the participant began the familiarization task, the boxes appeared along with the words, “Click on any of these two boxes and see what happens.”

This phase consisted of 4 trials, 2 pseudo-randomly (with no repeated presentations) ordered trials for each of the sample stimuli. Subjects repeated this phase until they performed with 100% accuracy on a 4-trial block. Phase 2 tested for symmetry by asking the participant to select the appropriate A stimuli given the B stimuli as the sample. It also consisted of 4 trials, and training was completed when the participant performed with 100% accuracy.

Feedback was provided after every trial in Phase 1. If a participant chose the correct stimulus, the words “Correct. Good Job.” appeared on the screen. The words were accompanied by a chiming sound. If the trial was performed incorrectly, the screen read “Wrong.” and a buzzing sound was provided. No feedback was provided in Phase 2, the phase that tests the B-to-A relationships. When the criterion was

met, the words “WELL DONE” appeared on the screen, along with the directions for MTS Task 1. These instructions read, “During some trials you will receive feedback. During others you will not. These tasks might be confusing at times. Just do the best you can. Try to make the correct choices throughout the experiment whether you are being told you are choosing correctly or not. Work through the trials as quickly as you can. To begin click on the BEGIN EXPERIMENT button below.”

*MTS Task 1.* As the participant read the above statements, instructions for the upcoming task were also reviewed verbally. As in the familiarization task, one stimulus appeared in the center of the top-third of the screen. An array of three other stimuli from which to choose was evenly spaced across the bottom-third of the screen. The process consisted of four phases.

All A stimuli were arbitrary black-and-white symbols, approximately 2 inches by 2 inches. The B stimuli were groups of words from one of the following categories: child behaviors, medical words, or fruits. Words to be used as the B stimuli were chosen in two ways. For the child behavior stimuli, words and phrases were taken from the Parent Daily Report Checklist (PDR; Patterson, Chamberlain, & Reid, 1982). The other B stimuli were chosen from the *Handbook of Semantic Word Norms* (Toglia et al., 1978). This book reports the findings of a study in which 2,854 words were rated on seven dimensions including concreteness, imagery, categorizability, familiarity, meaningfulness, number of attributes or features, and pleasantness. The words in stimulus B2 (medical words) and B3 (fruit words) were matched for six of the seven dimensions. They were drawn from a cluster of words that were high on concreteness, imagery, categorizability, familiarity, meaningfulness, and number of attributes or features. They were intentionally selected to differ in ratings of pleasantness (the medical words are low and the fruits are high) so that the effect of valence on class formation could be investigated (see Appendix I for all stimuli used in MTS tasks).

*MTS Task 1, Phase 1 (training).* In the first phase, subjects were trained to select one of three comparison stimuli (B1, B2, B3) in the presence of a sample stimulus (A1, A2, A3). The correct comparison choice in each trial was the stimulus that had been designated the same number as the sample (e.g., choosing B1 is reinforced in the presence of A1). Feedback identical to that in the familiarization task was provided after every trial. This phase consisted of 6 trials, 2 for each of the sample stimuli, presented in random order. Subjects repeated the first 6-trial block until they performed with 100% accuracy.

*MTS Task 1, Phase 2 (training).* The second phase was identical to the first except that C1, C2, and C3 were used as comparison stimuli. Feedback was provided after every trial. The 6-trial block was repeated until the participant performed with 100% accuracy.

*MTS Task 1, Phase 3 (mixed training).* The third phase consisted of mixed training trials. A stimuli were presented as samples with B and C stimuli as comparisons presented in random order. This phase consisted of a 12-trial block, with 2 trials with each of the B and C stimuli as comparisons. Feedback was again provided after every trial. The block was repeated as necessary until 100% performance was reached.

*MTS Task 1, Phase 4 (testing).* The final phase tested derived equivalence relationships by requiring the participant to select appropriate C stimuli with B stimuli as samples and select B stimuli with C as samples. There was no feedback during these trials that tested derived relational responding (B-to-C or C-to-B). This phase again consisted of 12 trials, although the experiment concluded at the end of one 12-trial block, regardless of participants’ performance. The words, “DONE! Thank you for your participation in this experiment.” were displayed on the screen.

*MTS Task 2.* After completing MTS Task 1, participants completed MTS Task 2. All of the instructions and procedures were identical to the first experiment. Only the stimuli were changed (See Appendix I). In

this experiment, the A stimuli were novel arbitrary symbols, the B stimuli were novel sets of words each representing child behaviors, and the C stimuli were sets of words that represented what would be considered acceptance of negative parental experiences and/or words that convey positive parenting strategies. The B stimuli were composed of items from the PDR. The C stimuli (parenting words) were chosen based on consistency with acceptance and commitment theory. These stimuli reflect acceptance of experiences, mindfulness, and flexibility with respect to parenting behaviors. Again, stimuli were matched as nearly as possible with respect to length.

## Results

### *Preliminary Analyses*

Descriptive analyses were conducted to investigate group characteristics. Partially by definition, the groups were different on measures of self-reported distress. Parenting Stress Index scores revealed a large difference in distressed mothers ( $M = 304.79$ ) and non-distressed mothers ( $M = 219.00$ ). Investigation of the Hopkins Symptom Checklist as a measure of general distress revealed that students showed the least distress ( $M = 40.71$ ), followed by non-distressed ( $M = 43.64$ ), and distressed mothers ( $M = 63.93$ ). Between group differences in general distress was potentially problematic because general distress has been linked to poor performance on MTS tasks (e.g., Wilson, 1998). To account for this relationship, participants' Hopkins scores were used as a covariate in analyses investigating the role of parental status. This allowed for general distress to be ruled out as the cause of differences in MTS performance measures.

With respect to demographic variables, the variation between groups was mixed. The education level of participants was approximately equal; the mean level of education in all three groups was partial college completion. There was more diversity with respect to age, income, and marital status. The students were the youngest ( $M = 23$ ), followed by non-distressed mothers ( $M = 33$ ), and distressed mothers ( $M = 34$ ). The students reported lower income ( $M = \$15,000$  or less per year) than either group of mothers ( $M = \$15,000-\$30,000$  per year for both groups). None of the students were married and the majority of mothers were.

### *Primary Analyses*

Series of ANCOVAs were run to investigate computer responding in both MTS Task 1 and MTS Task 2. Mixed factorial analyses (groups X classes) were conducted for the first MTS, allowing for the investigation of between and within group differences as well as their interactions. To analyze the second MTS, one-way (between groups) ANCOVAs were run. Throughout the series, the following MTS task variables were analyzed in order to examine the relationship between parental status and stimulus equivalence class acquisition: (a) number of trial blocks required to reach criteria, (b) percentage of correct responses, and (c) average latencies (response times). The Hopkins score was used as a covariate throughout. Significant findings were followed up with Tukey's HSD tests and/or paired t-tests.

**MTS1. Factorial (Groups X Classes) Examination of MTS Performance:** These analyses involved an investigation of whether participants in the three groups would form some stimulus classes more readily than others. The independent variables were parental status (distressed mothers, non-distressed mothers, or students who were not mothers) and stimulus class (i.e., behavior, fruit, or medical). The dependent variables were (a) percentage of correct responses and (b) average latencies in the training phases and the testing phase. Mauchly's test revealed that sphericity, or equality of variances, could not be assumed. A multivariate test, Wilks' Lambda, was therefore used.

*Percent correct.*

There were no significant main effects or interactions for percent correct in the three training phases (all  $F$ s  $< 1.5$ ,  $p$ s  $> .25$ ). In the testing phase, there were no significant main effects (group) for percent correct ( $F = .86$ ,  $p = .43$ ). However, there was a significant interaction for stimulus class and parental status,  $F(2, 38) = 2.37$ ,  $p < .05$  (See Figure 1). Approximately 11% of the variance was accounted for by the interaction.

The distressed mothers had the highest percent correct ( $M = 85.71$ ) when compared to non-distressed mothers ( $M = 69.64$ ) and students ( $M = 67.86$ ) within the behavior words class, whereas their performance in the other two stimulus classes was lower than the other participants. The distressed mothers had higher percent correct in the behavior class ( $M = 85.71$ ) than they did in the fruit ( $M = 67.86$ ) or medical ( $M = 82.14$ ) classes. This was not the case for non-distressed mothers or students.

In order to determine where significant differences existed, a series of paired t-tests was conducted. Comparisons of testing phase percent correct in the various classes were conducted for each group of participants. The only significant differences were between behavior and fruit classes for distressed mothers,  $t(13) = 2.02$ ,  $p < .05$ .

*Latencies.*

There were no significant main effects or interactions for average latencies in the three training phases or the testing phase (all  $F$ s  $< 2$ ,  $p$ s  $> .18$ ). However, there were several trends for total latency. Distressed mothers, throughout the three phases of training, spent less time on behavior class items ( $M = 104.14$ ) than time spent on fruit ( $M = 105.91$ ) and medical ( $M = 115.03$ ) items. Non-distressed mothers had the same pattern ( $M = 99.55$ ;  $M = 103.15$ ;  $M = 111.38$ ).

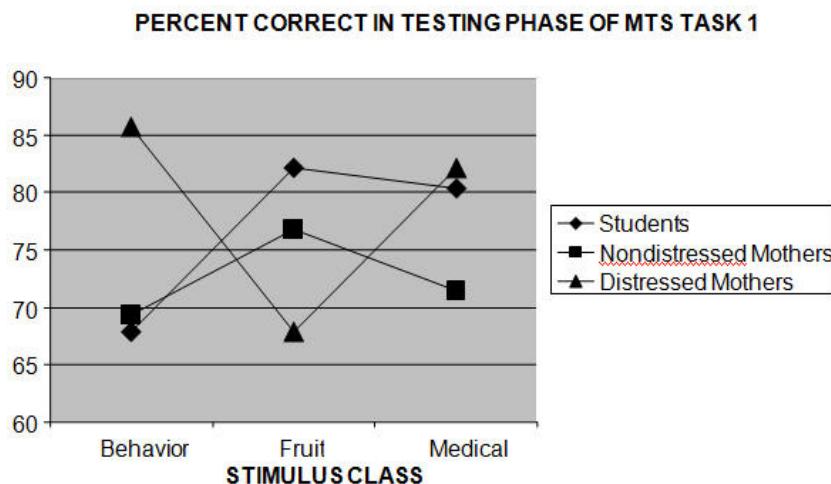


Figure 1. Percent Correct in Testing MTS Task 1.

The students took longer to respond to the stimuli in the behavior class ( $M = 63.09$ ) than they did to respond to the fruit ( $M = 47.83$ ) or the medical items ( $M = 57.69$ ).

MTS 2 Between Group Examination of MTS Performance: In the second experiment, between-group ANCOVAs were conducted with parental status as the independent variable and the Hopkins as a covariate. Similar to the first experiment, dependent variables were (a) number of trial blocks required to

meet criteria, (b) percentage of correct responses, and (c) average latencies. These analyses were conducted to examine flexibility in responding to pre-existing classes.

*Trial blocks.*

There were no significant differences between groups in number of trial blocks required in the first two phases of training (all  $F$ s  $< 1$ ,  $ps > .45$ ). There was a significant difference between groups in the mixed-training phase,  $F(2, 38) = 3.18, p < .05$ , with distressed mothers requiring more trials ( $M = 6.21$ ) than the non-distressed mothers ( $M = 2.93$ ) and students ( $M = 2.79$ ). Approximately 14% of the variance in number of trial blocks required was accounted for by group status (See Figure 2).

A series of t-tests was conducted to look for specific differences throughout the experiment phases. Paired t-tests revealed that distressed mothers required significantly more trial blocks ( $M = 6.21$ ) in the third training phase than they had needed to meet criterion in the first training phase ( $M = 3.07$ ),  $t(13) = -1.82, p < .05$ . Non-distressed mothers required significantly less training in the third phase ( $M = 2.93$ ) than they did in the second ( $M = 3.93$ ),  $t(13) = 1.77, p < .05$ . For students, there were no significant differences (all  $ps > .09$ ) in number of trial blocks required in the various training phases.

TRIAL BLOCKS TO MEET 100% ACCURACY IN MTS 2 TRAINING

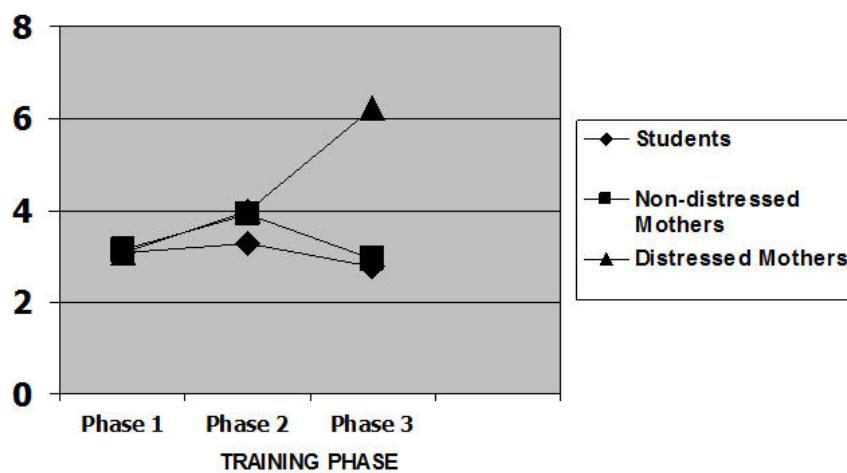


Figure 2. MTS 2 Between group differences in MTS trial blocks to become accurate.

*Percent correct.*

There were no significant differences between groups in percent correct in the first two phases of training, or in the testing phase (all  $F$ s  $< 2.5$ ,  $ps > .13$ ). There was a significant difference in percent correct between groups in the mixed training phase,  $F(2, 38) = 8.09, p < .001$ , with distressed mothers obtaining a lower percent correct ( $M = 81.71$ ) than non-distressed mothers ( $M = 91.07$ ) and students ( $M = 91.21$ ). Approximately 30% of the variance in percent correct could be explained by group status (See Figure 3). Tukey's ( $p < .05$ ) revealed that the significant differences were between students and distressed mothers, and between non-distressed mothers and distressed mothers.

*Latencies.*

There were significant differences between groups on measures of average latency in the second and third phases of training in experiment 2. In the second phase distressed mothers took significantly longer to respond ( $M = 5.48$ ) than non-distressed mothers ( $M = 3.66$ ) and students ( $M = 2.69$ ),  $F(2, 39) = 3.83, p < .05$ . Approximately 17% of the variance was accounted for by group status. The same pattern was evident in the third phase, with about 22% of the variance

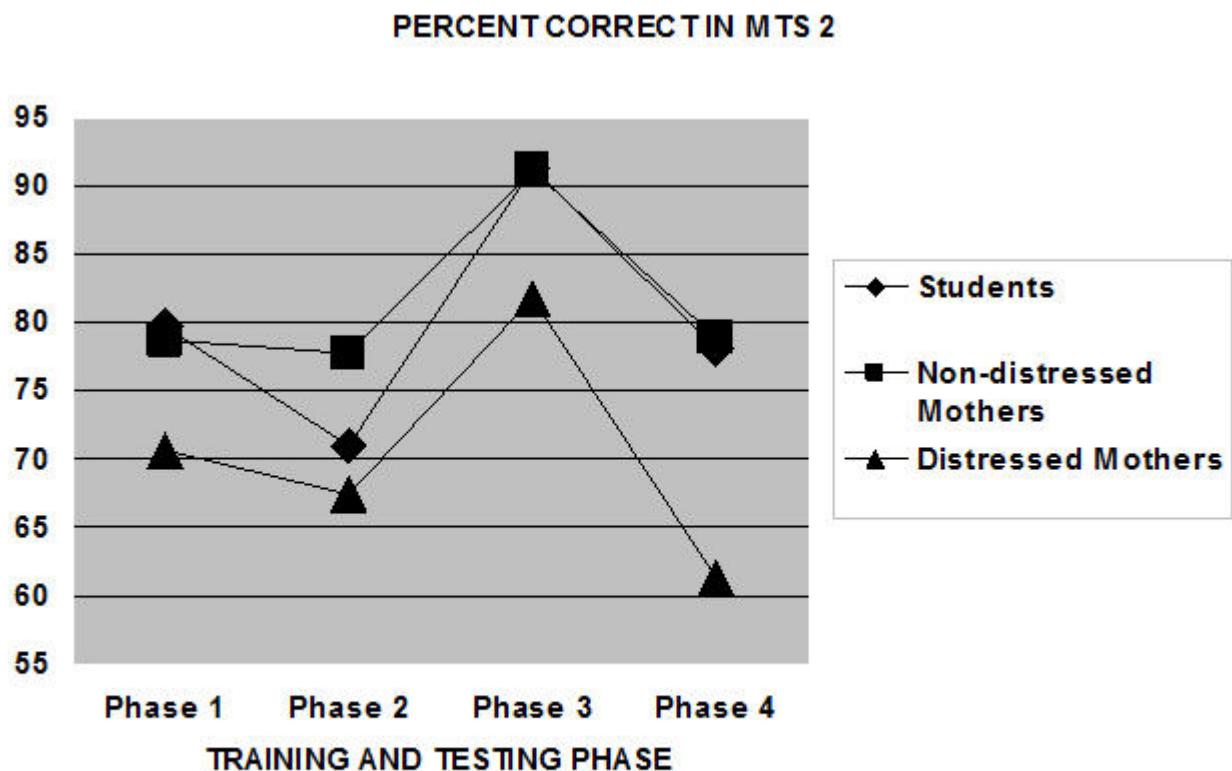


Figure 3. Between group differences in Percentage Correct following training in MTS Task 2.

accounted for by group membership. Distressed mothers took significantly longer to respond ( $M = 5.78$ ) than non-distressed mothers ( $M = 3.96$ ) and students ( $M = 2.67$ ),  $F(2, 39) = 5.49, p < .01$  (See Figure 4).

**Discussion**

Previous research has suggested that participants easily acquire classes consisting of emotionally relevant stimuli along with neutral stimuli. In addition, several studies have found that participants show an inflexibility in class formation when they are required to form classes with emotionally relevant stimuli from pre-existing and seemingly contradictory classes. Prior to this study, these processes had never been examined with respect to parenting. It is well-established that problematic parenting behaviors can emerge through direct conditioning. Traditional accounts of parent-child interactions have outlined these processes and effective treatments have emerged from this body of literature. It was postulated, however, that stimuli might come to exert control over parenting behavior through indirect means as well.

*MTS Task One: Examination of Class Acquisition*

The first MTS task examined differential class acquisition with one set of emotionally relevant stimuli. There were significant differences in response latencies across classes among participants during the MTS task. Mothers took longer to respond than did students, and distressed mothers

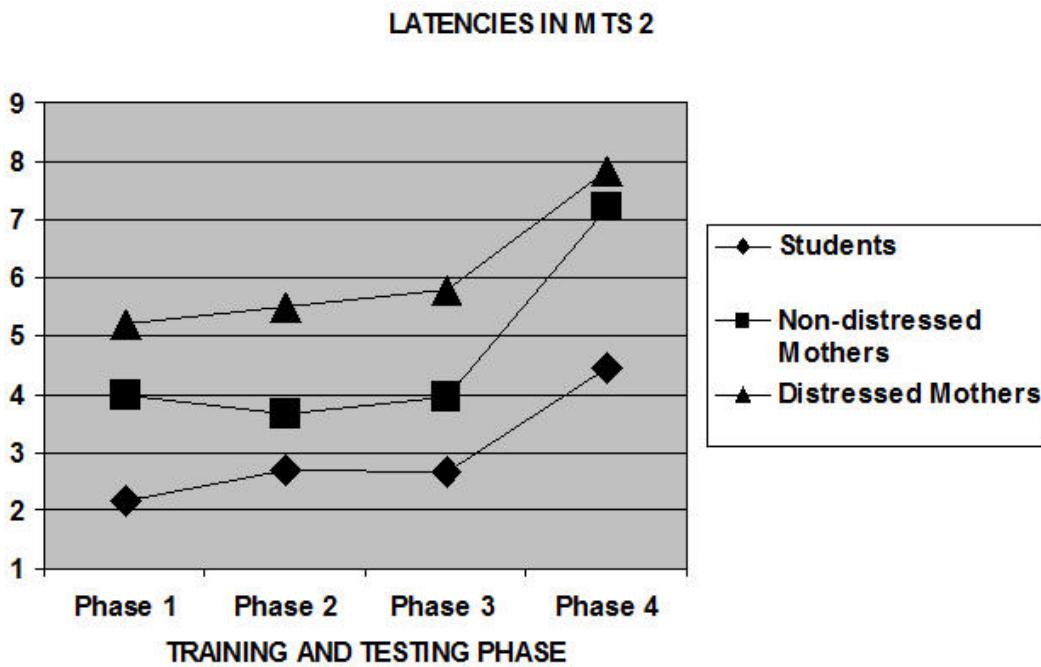


Figure 4. Mean latency to respond to MTS task 2 for each group.

were the slowest to respond. This is consistent with the notion that general distress may lead to poorer performance on MTS tasks (Wilson, 1998). However, during the acquisition of classes containing the emotionally relevant stimuli (negative child behavior words), distressed mothers responded more quickly to child behavior stimuli than they responded to other stimuli. In addition, distressed mothers obtained a higher percent correct in this class than either of the other groups. They also had a higher percent correct in this class than they did in either of the other two classes. These findings are consistent with previous studies (e.g., Plaud, 1995; Watt et al., 1991; Wilson, 1998) that show that emotional relevance plays a role in class formation. More specifically, they suggest that equivalence class acquisition is facilitated by the presence of emotionally relevant stimuli when the class contains such stimuli and other, previously neutral, stimuli. In this case, distressed mothers more readily added previously neutral stimuli to classes that contained the emotionally relevant stimulus (i.e., the negative child behavior words and phrases).

Differential and facilitated class acquisition only occurred when the stimuli were negative child behavior words and not when the classes to be formed contained neutral stimuli and fruit or medical words. This finding is consistent with two key pieces of stimulus equivalence literature. First, previous studies that included arbitrary or less emotionally relevant conditions (e.g., Plaud's 1995 flower condition; Leslie's 1993 non-anxiety condition) indicated that all participants non-differentially acquired these classes. Second, this speaks to the strength of general class formation. All groups of participants were readily able to form neutral classes with few errors. This study lends additional support to the body

of literature that suggests equivalence class formation and relating, more generally, is a widespread ability (Hayes, Barnes-Holmes, & Roche, 2001; Sidman, 1971).

*MTS Task Two: Examination of Class Flexibility*

The second task examined flexibility in forming new classes with two sets of emotionally relevant stimuli likely in pre-existing contradictory classes (negative child behavior words and positive parenting words). Again, distressed mothers were slower to respond to the task than were non-distressed mothers and students. It is possible that distressed mothers were slower to respond due to higher levels of general distress. However, it is also possible that slower response latencies may have resulted from unfamiliarity with the computer and/or learning tasks. Many of the mothers had not recently been in school or work environments that would have required them to do similar things. Students, on the other hand, encounter these demands frequently. This is an unfortunate potential confound.

It was expected that non-mothers would have the least difficulty pairing negative child behaviors with positive parenting behaviors, non-distressed mothers would have some difficulty with that pairing, and distressed parents would have the most difficulty. These differences were evident in the mixed training phase, but not in the testing phase. It is possible that participants had so much practice, that performance of all participants reached a similar level in the testing phase, indicating a ceiling effect.

Distressed mothers took significantly more trials to reach criteria than the other groups in the mixed training phase, indicating that distressed mothers began to perform more poorly as classes that contained both negative child behaviors and positive parenting stimuli were being trained. The percent correct and latencies in that training phase reflected the same pattern. Given that general distress was statistically accounted for, this poor performance can be attributed to the unique contribution of parenting stress. These findings can be discussed in terms of the robust and inflexible nature of response to different classes of psychologically relevant stimuli. In theory, distressed mothers had difficulty deriving relations between negative child behavior words and positive parenting words, because this required them to pair stimuli that contradict their previous direct and indirect conditioning histories. The higher number of trial blocks required, lower percent correct, and longer latencies evidenced by distressed mothers on this task are consistent with a number of previous studies (e.g., Barnes et al., 1996; Leslie et al., 1993) evidencing inflexibility, and these results suggest that classes of emotionally relevant stimuli are difficult to relate in new ways.

*Implication of Findings*

The findings on facilitated acquisition and inflexibility may have important clinical and treatment implications for parents. As classes containing emotionally relevant stimuli are more readily acquired, the functions of such stimuli are easily transferred to many stimulus events. Stimulus control and transfer have been examined in a variety of psychologically relevant areas, including fear (Douher, 1998; Douher, Markham, Greenway, & Wulfert, 1994; Plaud, 1995), sexual arousal (Barnes & Roche, 1997; Plaud, Gaither, Franklin, Weller, & Barth, 1998) and substance abuse (DeGrandpre & Bickel, 1993; Wilson, 1998), among others. In the case of negatively rated events, like those examined in this study, conditioning processes therefore result in an expansion of conditioned aversives, to the extent that children's behavior and, in fact, children themselves may become conditioned aversives (Dumas & Wahler, 1985). We know from the animal learning literature that the presence of conditioned aversives generates a stressful environment in which elicitation and avoidance rise and other operant behaviors are suppressed (Catania, 1998). As more and more stimuli are deemed equivalent to negative child behavior, parental behavior may become increasingly under the control of stimuli far removed from direct environmental contingencies. This may result in narrow and rigid parenting behavior and lessened contact with relevant contingencies that would maintain more adaptive parenting.

The inflexibility in class formation seen in the current study also suggests a role for indirect learning processes in the maintenance of maladaptive parenting behaviors. Distressed mothers had more difficulty forming equivalence classes containing both negative child behavior words and positive parenting words despite negative consequences (i.e., computer feedback). Such inflexibility reflects difficulty in responding to contingencies that contradict previously established learning history. This is particularly relevant for treatment efforts with distressed parents as at times, therapists may be asking parents to do things that are incongruent with the previous learning history. Consider, for example, that many parents have learned (directly and indirectly) that “whining” is reason for punishment. Attempting to coach parents that “whining” is an occasion for ignoring and/or discussion of their children’s feelings will not be easy. Therapists should consider this when coaching parents to try new parenting behaviors. In addition to being inconsistent with prior learning history, these skills are potentially emotionally difficult. If the function of a mother’s behavior is escape or avoidance of discomfort, she might not be willing to try different parenting strategies that may put her in situations which occasion discomfort (e.g., interactions with her child and associated stimuli which have become conditioned aversives). Expanding the treatment context to include the indirect processes may be key. It is likely that work to lessen the conditioned arousal and inflexibility will be necessary along with skills training (Coyne & Wilson, 2004).

A treatment that considers direct and indirect learning histories will perhaps be the most productive. The portion of treatment addressing directly conditioned events would ideally focus on skills training in areas of deficit. The portion of therapy that addresses indirect conditioning may include procedures (such as the use of mindfulness and acceptance techniques) that foster flexibility in responding to aversive stimuli. The loosening of stimulus control through this work may result in increasing available functions, thereby broadening the parents’ behavioral repertoire. It may be beneficial to address context in a manner that allows for the change of function.

This was the first study of this nature, and studies of indirect conditioning and resulting treatments are still quite new. Given these results, further work in these areas seems justified. Treatment development and outcome studies could be done to address the relevant issues.

#### *Limitations and Future Directions*

Presumably, negative child behavior words and positive parenting words constituted emotionally relevant stimuli for parents and particularly distressed parents. While their response patterns during the MTS tasks indicated as much, a direct assessment of the emotional salience of such stimuli to the participants would have been ideal. Such an assessment of all the stimuli used in a given MTS task, including the arbitrary symbols, pre- and post- task would also allow for an assessment of transfer of stimulus function. Theoretically, following equivalence class formation, other stimuli in the same class would assume the functions of the negative child behavior words. Future studies of such indirect learning in parenting should examine these processes.

One way future studies could increase the likelihood of stimulus salience would be to tailor stimuli to individual participants. Mothers could be asked to list the child behaviors that upset them the most and the positive parenting strategies that are the most difficult for them. Or, they could be instructed to engage in specific positive parenting strategies and their ability to do so could be rated. These behaviors could be used (either in word, picture, or video form) as computer stimuli. The names of participants and their children could be used as well in order to heighten their salience. Another way to make stimuli more salient would be to have the mothers watch a video clip of a child misbehaving, or to interact with their own children in a frustrating situation prior to beginning the computer tasks.

There were also some problems with pragmatic issues in running the study. Originally, the use of mothers and fathers was proposed. It was difficult to obtain male participants, and this made results less generalizable. Future studies should attempt to include fathers as well as mothers. In addition, some participants completed both experiments in one setting, while others did the first and second MTS tasks at two different times. The time between sessions was approximately one week for those participants. Simply waiting a week would introduce within subject variability, and the fact that the times between testing were not the same for all participants compounds that variability by adding between subject differences.

Perhaps of most concern was the variability in completion of the PSI prior to completing the first experiment. Some participants took the PSI in the same session as they completed the first (if not both) MTS task. However, others had taken the PSI up to a month before. The PSI is a sound instrument with good test-retest reliability; however, there is a concern. Many of the mothers were in treatment, and their parenting stress level as reported by the PSI may have changed in the time that elapsed between the PSI completion and this study. It is possible that groups were divided based upon outdated information; thus, differences between distressed and non-distressed mothers may have been concealed by inappropriate grouping. Future studies should ensure time and financial resources so that there is increased experimental control. Obtaining a stable baseline of parental stress report would be useful.

It is important to link responding on MTS tasks to more general behavior. One experimental addition that may help explore the link in responding on MTS tasks and parent behavior in more global situations would be to administer a measure of experiential avoidance. One such measure is the AAQ (Hayes et al., 2004). Examination of the relationship between AAQ scores and MTS responding could provide an account of whether inflexibility is task specific or the result of a broad tendency to avoid interaction with negative content. In order to make applied conclusions about such work, the relationship between inflexible MTS task responding and “real-world” parent-child interactions should also be conducted. Parent-child interactions could be coded for attunement and related process factors in addition to ratings of behavioral flexibility as more traditionally examined. Ratings of attention or planned ignoring, redirection, and related parenting tasks could be coded. These ratings could be compared to number of trial blocks required, percent correct, and latencies on MTS tasks with relevant stimuli. This would help to see if the hypothesized behavioral consequences of the parents’ emotional reactivity and inflexibility (e.g., missing good behavior and focusing on negative behavior) do, in fact, exist. Another extension of this process to assess social validity, or real-world implications, of the MTS finding would be to record participants during the MTS task and use that information to assess overt behavioral patterns in an experimental fashion. Researchers could code parents’ facial expressions and verbal comments as they complete the MTS task, and create “stressed” and “nonstressed” MTS performance categories. Then, those categories could be displayed by actors and rated by experts on some dimensions of whether or not overt stress is displayed. That variable could subsequently be related to MTS performance as well as the coded parent-child interactions previously mentioned. In addition, treatment effects could be monitored through examination of whether any of these behaviors change over time.

### *Conclusion*

In this study, distressed mothers were shown to readily acquire stimulus equivalence classes containing negative child behavior words and neutral stimuli (MTS 1) and to have difficulty forming classes with these words and positive parenting words despite negative feedback (MTS 2). Understanding the establishment of this sort of inflexible responding might eventually illuminate the inflexibility seen among distressed parents in their parenting repertoire. Such indirect processes may help us to understand not only how children themselves may become conditioned aversives (Dumas & Wahler, 1985), but also how activities or aspects of the children unrelated to behavior problems may begin to collapse into a class with behavior problems. Future research should investigate features of context that

can heighten and more importantly, the contexts that might lessen the inflexibility of this stimulus control and thereby enable new learning. The investigation of direct conditioning processes has provided a framework for the construction of our most potent treatment technologies for child behavior problems and for parent training. Investigation of indirect learning processes, such as those described in relational frame theory, may allow us to further expand the benefits provided by behavioral treatments for children and parents.

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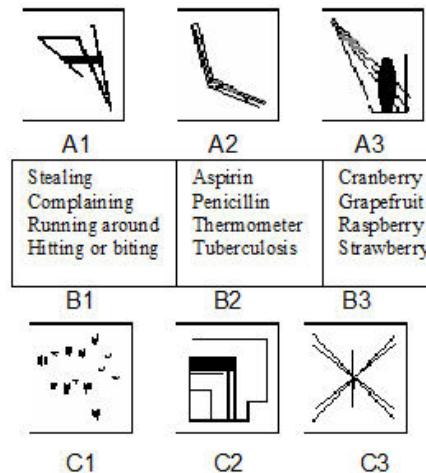
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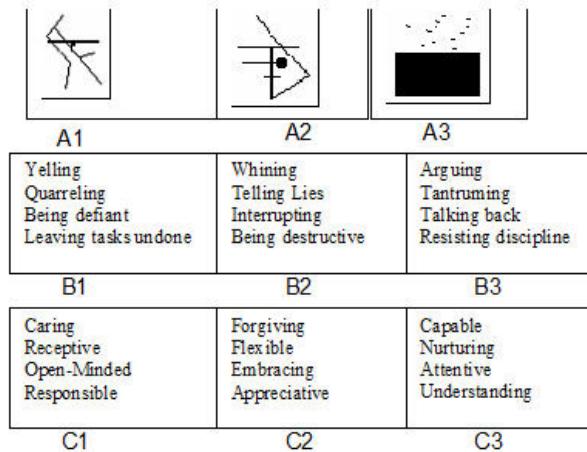
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## APPENDIX I

### Stimuli for Experiment 1



### Stimuli for Experiment 2



## Author Contact Information:

Amy R. Murrell, Ph.D.  
Assistant Professor  
Department of Psychology  
P.O. Box 311280  
Denton, TX 76203-1280

940-565-2967 (phone)  
940-565-4682 (fax)  
[amurrell@unt.edu](mailto:amurrell@unt.edu)

Cicely T. LaBorde, M.S.  
University of North Texas  
Psychology Department  
P.O. Box 311280  
Denton, TX 76203-1280  
940-369-8826  
[claborde@unt.edu](mailto:claborde@unt.edu)

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